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THE SUPPOSED CRETACEOUS ANT *CRETACOFORMICA EXPLICATA* JELL AND DUNCAN (HYMENOPTERA)

I. D. NAUMANN

Division of Entomology, CSIRO, G.P.O. Box 1700, Canberra, A.C.T. 2601.

Abstract

The holotype of *Cretacoformica explicata* Jell and Duncan from the early Cretaceous Koonwarra Fossil Beds, Victoria, is redescribed and the wing venation re-interpreted. Placement of the species within the Formicidae cannot be confirmed and a recent transfer of the species to the Diapriidae is not supported.

Of the handful of early Cretaceous Hymenoptera described by Jell and Duncan (1986), *Cretacoformica explicata* is potentially the most controversial. The species is represented by a unique, nearly complete, fully winged, impression fossil and was identified by Jell and Duncan as a winged, male ant. The age of the Koonwarra Fossil Beds and their rich insect assemblage is estimated at between 115 and 118 million years, which would make *C. explicata* the oldest known formicid.

In their overview of fossil ants Holldobler and Wilson (1990) reserved their opinion on the identity of *C. explicata*, largely because details of the mesosomal-metasomal articulation cannot be determined from the single known specimen. However, they suggested that the creature might more comfortably be placed in an aculeate family other than the Formicidae. Without explanation Darling and Sharkey (1990) transferred *C. explicata* to the Diapriidae, a family of proctotrupoid, parasitic wasps.

In connection with studies of two enigmatic, undescribed, living proctotrupoid wasps, I have re-examined the holotype of *C. explicata*. Some details of the original description require correction (e.g. number of antennal and tarsal segments) or amplification, and a re-interpretation of the wing venation is necessary.

Cretacoformica explicata Jell and Duncan (Fig. 1)

Cretacoformica explicata Jell and Duncan, 1986: 114, 190-191; Holldobler and Wilson, 1990: 23; Darling and Sharkey, 1990: 126.

Type—VICTORIA: *Holotype*, Koonwarra Fossil Bed, PL425, Gippsland (Museum of Victoria, Melbourne; type number NMVP102301 A and B).

Redescription

Length—Body 3.3 mm. Forewing 3.1 mm.

Head—In dorsal view wider than long. Antennal shelf absent.

Antenna—Moniliform, slender, 15-segmented, at rest not extending posteriorly beyond posterior extremity of mesosoma. Scape more than 2.0 × longer than wide. Basal flagellar segments unmodified (i.e. without carinae or emarginations).

Mesosoma—Neck visible from above. Pronotal collar short, posteriorly deeply emarginate. Lateral panel of pronotum deeply recessed for reception of reflexed forefemur. Mesoscutum with percurrent, sharply defined notauli. Axillae not advanced. Metathoracic-propodeal area tapering posteriorly.

Legs—Femora subapically swollen, tibiae apically expanded. Foretibia with curved calcar. Hind tibia with 2 straight spurs, length of longer spur less than maximum width of hind tibia. Tarsi 5-segmented, basitarsus the longest segment.

Forewing—Venation as in Fig. 1. Pterostigma present, subtriangular. C, Sc + R, stigmal vein, basalis, postmarginal vein distinct, wholly or partially tracheate. Rs, M + CuA, M, CuA, 1A distinct, probably indicated by coloration; *m-cua* cross-veins weakly indicated. Rs straight, not forked. Costal cell open. Radial cell closed, postmarginal vein extending slightly beyond its apex. Median, submedian and subdiscoidal cells closed.

Hindwing—Sc + R tracheate, continuous from base to hamuli. One closed cell present.

Metasoma—Petiolate. Gaster ovate, with 5 tergites. First tergite occupying 0.3–0.4 of gaster, its posterior 0.2–0.3 forming conspicuous, transverse furrow. Following 3 tergites very short, posterior 0.5 of each forming transverse furrow. Apical tergite posteriorly rounded.

Discussion

I am unable to place *C. explicata* in a family of Hymenoptera. Since neither the propodeum nor the petiole can be observed in the only known specimen, I concur with Holldobler and Wilson (1990) that the species cannot confidently be assigned to the Formicidae. Because of *C. explicata*'s distinct waist and relatively reduced wing venation it is undoubtedly apocritan. The distinct, enclosed costal cell definitely excludes it from the Megalyroidea, Ichneumonoidea, Ceraphronoidea, Cynipoidea and Chalcidoidea and

the presence of a pterostigma excludes it from the Platygasteroidea (Naumann 1991). Also the relatively reduced wing venation (e.g. M + CuA, M, CuA, 1A not tracheate; absence of closed submarginal cells) suggests that the species does not belong in the Stephanoidea, Trigonalyoidea, Evanioidea, Sphecoidea or Apoidea. In the absence of better preserved material *C. explicata* cannot be excluded from the Proctotrupoidea, Chrysidoidea or Vespoidea. Interestingly, the interpretation of the wing venation depicted in Fig. 1 is similar to that of some proctotrupoids (see Naumann and Masner 1985), in particular some belytine Diapriidae.

However, the following features of *C. explicata* are inconsistent with placement in the Diapriidae:

(1) forewing with pterostigma (absent in Diapriidae);

(2) first gastral tergite occupying less than 0.4 of gaster (in Diapriidae the first gastral tergite is reduced to this size only in *Termitopria* Musebeck and several undescribed, feebly sclerotised, termite associates with extremely reduced wing venation);

(3) frons without antennal shelf (present in all Diapriidae except *Ismarus* Haliday, in which the first gastral tergite occupies more than 0.5 of the gaster);

(4) anterior gastral tergites with deep, transverse furrows (such furrows absent in Diapriidae).

Until additional material of *C. explicata* becomes available for study its family placement must remain conjectural.

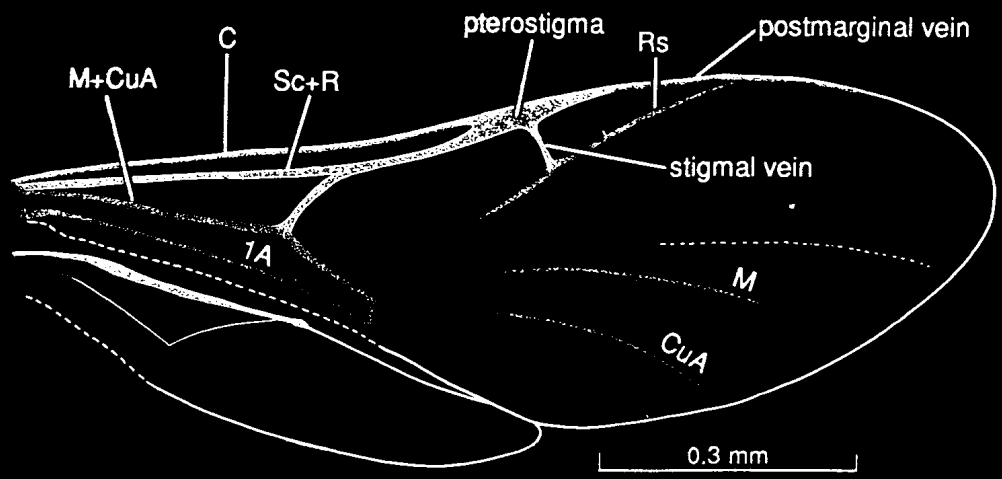

FIG. 1—*Cretacoformica explicata*, interpretation of wing venation. Composite drawing from left and right wings of both counterparts of holotype.

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